UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/649,270	08/27/2003	Yifan Gong	TI-35988	6432

23494 7590 03/06/2007 TEXAS INSTRUMENTS INCORPORATED P O BOX 655474, M/S 3999 DALLAS, TX 75265	EXAMINER	
	LENNOX, NATALIE	

ART UNIT	PAPER NUMBER
2609	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/06/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

PTOL-90A (Rev. 10/06)

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08/27/2003*.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-9* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *02/03/2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

        1.☐ Certified copies of the priority documents have been received.

        2.☐ Certified copies of the priority documents have been received in Application No. _____.

        3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.

5)☐ Notice of Informal Patent Application

6)☐ Other: _____.

DETAILED ACTION

Specification

1.   The disclosure is objected to because of the following informalities: On

paragraph [0030] for λ_2 it says "Index in the frequency axis (1... 128 of the first

estimated formant." This sentence is missing the closing parenthesis after the number

128 and also it should say second estimated formant instead of first. Appropriate

correction is required.

Claim Rejections - 35 USC § 112

2.   The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly
> claiming the subject matter which the applicant regards as his invention.

3.   Claims 4 and 8 are rejected under 35 U.S.C. 112, second paragraph, as being

indefinite for failing to particularly point out and distinctly claim the subject matter which

applicant regards as the invention.

Claim 4 recites the limitation "said threshold value" in line 1. There is insufficient

antecedent basis for this limitation in the claim. However, it appears to be dependent

from claim 2 and has been treated as such for the purposes of examination. Affirmation

of this is required by the appropriate amendment.

Claim 8 recites the limitation "said inverse filtering" in line 1. There is insufficient

antecedent basis for this limitation in the claim. However, it appears to be dependent

from either claim 6 or 7. This claim will be treated as being dependent from claim 6 for

the purposes of examination. Affirmation of this is required by the appropriate

amendment.

Claim Rejections - 35 USC § 102

4.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that

form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5.   Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Mauro et al.

(US 2001/0001853).

As per claim 1, Mauro teaches a method of detecting speech in an incoming

signal comprising the steps of:

performing a preprocessing step of extracting a noise estimate of the incoming

signal to augment signal-to-noise ratio of a speech signal (see paragraph [0034] where

channel noise energy estimates are provided by the noise energy estimator 214a of Fig.

2); and

measuring the periodicity of the incoming signal using an autocorrelation function

to determine whether a signal frame correspond to a speech frame or not (see

paragraph [0039] where the rate decision element 212 of Fig. 2 for determining the

presence of speech, may be substituted by a normalized autocorrelation function

(NACF) which measures periodicity in the speech frame).

Claim Rejections - 35 USC § 103

6.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7.   Claims 2 and 3 are rejected under 35 U.S.C. 103(a) as being obvious over Mauro

et al. (US 2001/0001853) in view of Gong et al. (US Patent 6,980,950).

The applied reference has a common inventor with the instant application.

Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art

only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome

by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in

the reference was derived from the inventor of this application and is thus not an

invention "by another"; (2) a showing of a date of invention for the claimed subject

matter of the application which corresponds to subject matter disclosed but not claimed

in the reference, prior to the effective U.S. filing date of the reference under 37 CFR

1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and

reference are currently owned by the same party and that the inventor named in the

application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer

in accordance with 37 CFR 1.321(c). This rejection might also be overcome by showing

that the reference is disqualified under 35 U.S.C. 103(c) as prior art in a rejection under

35 U.S.C. 103(a). See MPEP § 706.02(I)(1) and § 706.02(I)(2).

As per claim 2, Mauro et al. teaches the method of claim 1, but doesn't disclose

that said periodicity measurement is defined as:

$$\rho = \max_{T_l}^{T_h} R_x(\tau)$$

where T_h and T_l are pre-specified so that the period will range in the range of

speech and the signal is speech if ρ is above a given threshold. Gong et al. teaches the

periodicity measurement (equation (11) on Col. 4). It would have been obvious to one

having ordinary skill in the art to use the periodicity measurement as taught by Gong et

al. for Mauro et al.'s method for detecting speech because Gong et al. provides an

utterance detector for speech recognition.

As per claim 3, Mauro et al. as modified by Gong et al. teach the method of claim

2, wherein said period is between about 75 Hz and 400 Hz (Gong et al.'s Col. 4, lines 9-

10).

8.   Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mauro et

al. (US 2001/0001853) as modified by Gong et al. (US Patent 6,980,950) as applied to

claim 2 above, and further in view of Wu et al. (US Patent 6,473,735).

The applied reference has a common inventor with the instant application.

Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art

only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome

by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in

the reference was derived from the inventor of this application and is thus not an

invention "by another"; (2) a showing of a date of invention for the claimed subject

matter of the application which corresponds to subject matter disclosed but not claimed

in the reference, prior to the effective U.S. filing date of the reference under 37 CFR

1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and

reference are currently owned by the same party and that the inventor named in the

application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer

in accordance with 37 CFR 1.321(c). This rejection might also be overcome by showing

that the reference is disqualified under 35 U.S.C. 103(c) as prior art in a rejection under

35 U.S.C. 103(a). See MPEP § 706.02(I)(1) and § 706.02(I)(2).

As per claim 4, Mauro et al. as modified by Gong et al. teach the method of claim

2, but they don't disclose said threshold value to be set to maximize speech detection

accuracy. Wu et al. teach that when speech verifier utilizes the minimum differential

scores as the threshold values, recognition accuracy is maximized (Col. 8, lines 63-66).

It would have been obvious to one having ordinary skill in the art to use the feature of

setting the threshold value to maximize speech detection as taught by Wu et al. for

Mauro et al.'s method for detecting speech as modified above because Wu et al.

provides a method for speech verification using a confidence measure.

9.   Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mauro et

al. (US 2001/0001853) as applied to claim 1 above, and further in view of Focht (US

Patent 3,603,738) and Graumann (US Patent 6,175,634).

As per claim 5, Mauro et al. teach the method of claim 1, but doesn't specifically

disclose said extracting step including the steps of:

converting the spectrum of the incoming signal into logarithmic domain,

removing high frequency components in logarithmic domain by recurrent filtering

along the time axis,

establishing an estimate of noise background, converting the estimate into linear

domain, and

suppressing the noise background from the signal, in linear domain.

Focht teaches a circuitry where a speech input is supplied to a logarithmic amplifier and

a low pass filter for removing the high frequency components (logarithmic amplifier 52

and low pass filter 54 of Fig. 7, also Col. 7, lines 56-57 and lines 69-73). It would have

been obvious to one having ordinary skill in the art to use the features of a logarithmic

amplifier and low pass filter as taught by Focht for Mauro et al.'s method for detecting

speech because Focht provides means and methods for generating a plurality of

parameters representative of a speech wave.

Graumann teaches a noise suppressor that includes a frame energy estimator, an

attack and decay throttle, an energy mapper, a log-to-linear converter, and an

attenuator that attenuates the input signal according to a signal received from the log-to-

linear converter (noise suppressor 260, log-to-linear converter 275, and attenuator 276

from Fig. 17, also Col. 11, lines 1-23 describe the process for the suppression of the

noise background or attenuation of the signal). It would have been obvious to one

having ordinary skill in the art to use the feature of a noise suppressor as taught by

Graumann for Mauro et al.'s method for detecting speech as modified by Focht above

because Graumann provides a noise suppression solution which improves the overall

quality of transmitted audio.

10.   Claims 6-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Mauro et al. (US 2001/0001853) as modified by Focht (US Patent 3,603,738) and

Graumann (US Patent 6,175,634) as applied to claim 5 above, and further in view of

Markel (Digital Inverse Filtering – A New Tool for Formant Trajectory Estimation, June

1972).

As per claim 6, Mauro et al. as modified above teach the method according to

claim 5, but fail to specifically disclose including the preprocessing step of spectral

inverse filtering. Markel teaches a method for spectral inverse filtering (left column of

page 132, at the end of the 4th paragraph, "inverse filter is designed to transform the

input spectrum into a white noise or constant spectrum...", also Fig. 4 (D) shows the

analysis result of the inverse filter). It would have been obvious to one having ordinary

skill in the art to use the feature of an inverse filter as taught by Markel for Mauro et al.'s

method for detecting speech as modified above because Markel provides an inverse

filter useful for estimating resonance or formant structure of voiced speech.

As per claim 7, Mauro et al. as modified above teach the method according to claim 6, wherein said inverse filtering is based on a normalized approximation of the envelope of the short term speech spectrum derived from a local maxima of the short term speech spectrum (In Markel's part IV (The Inverse Filter Algorithm) on page 133, 3rd paragraph on the right, *"the magnitude spectrum corresponding to the estimate of the input spectrum is computed. The magnitude spectrum is scanned and the L_k local maxima $p_k(l)$, $l=1, 2, ..., L_k$ in frame k are recorded. The set of all local maxima defines the raw data from which the formant trajectories are to be estimated"*. Also on part IV, page 131, 3rd paragraph on the right, *"since speech is a continually time-varying process, short-term analysis of sets of contiguous data samples at some specified frame rate is needed"*.)

As per claim 8, Mauro et al. as modified above teach the method according to claim 6, wherein said inverse filtering is performed in a log frequency domain and is implemented by subtracting from the original spectrum the estimated inverse filtering spectrum (In Markel's part III (Formant Extraction and the Inverse Filter) on page 130, where Fig. 1 (A) shows the representative spectrum, Fig. 1 (C) shows the estimated inverse filtering spectrum and Fig. 1 (D) shows the spectrum of the inverse filter output. From the figures it can be appreciated that the filtering is performed in a log frequency domain and that the inverse filter output of Fig. 1 (D) is obtained from subtracting the spectrum of Fig. 1 (C) from the original spectrum of Fig. 1 (A)).

As per claim 9, Mauro et al. as modified above teach the method according to claim 6, including spectral reshaping to create an artificial valley in the spectrum before

inverse filtering if the original spectrum has two formants close together and low in the speech spectrum (In Markel's part IV (The Inverse Filter Algorithm), on page 132, 3rd paragraph on the left, for the spectrum of Fig. 4 (A) *"it is quite clear that there are two closely spaced low formants and two additional formants"*, a Hamming window is applied to the original spectrum of Fig. 4 (A) in order to obtain the spectral representation of Fig. 4 (C)).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Natalie Lennox whose telephone number is (571) 270-1649. The examiner can normally be reached on Monday to Friday 7:30 am - 5:00 pm (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Xiao Wu can be reached on (571) 272-7761. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for

published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

USPTO Customer Service Representative or access to the automated information

system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

NL   2/22/2007

XIAO WU
SUPERVISORY PATENT EXAMINER